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ABSTRACT

In this study on schema theory, interviews were conducted with three adults to identify the schema for particular words or phrases (pencil, making a hot drink, talking), which required identifying all those dimensions of meaning involved implicitly and explicitly in how the word/phrase is used. Results revealed that subjects described their ideas predominantly as pictorial images, but also using descriptions and role playing. Most images were recollections of past experiences. Difficulties encountered in obtaining and presenting the data are discussed, such as the involvement of many schemata in the understanding of the meaning of a single word or phrase, the effect of the interaction between verbal-auditory and visuo-spatial systems on understanding, and cultural influences on memory. A program of Christchurch College of Education (New Zealand) is described in which teacher trainees are introduced to schema theory, investigate the schema children have of common social events, and apply action research theory to the area of culture and ethnicity in preparing classroom resources that address identified needs. The paper concludes that it is essential for teacher training to develop the skills to examine and analyze schema (both the teacher's and the child's) in order to achieve a relevant, equitable classroom curriculum. (Contains 11 references.) (JDD)

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Mindful Management of the Curriculum: A Possible Role for Schema Theory

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The process of interpreting and applying the curriculum in the school envrionment is an essential teaching skill. Previous research suggests that teacher belief constructs will impact upon this process, changing the expression and nature of the classroom curriculum. This holds particular significance for those who are seeking to address equity issues. This study investigates the possible use of schema theory in order to assist the teacher to focus upon, identify and meet the needs of students. Interviews were conducted to assess the efficacy of one method of obtaining data about schema. Evaluations arising from these interviews have been used to design a preservice primary teacher training course that applies schema theory to culture and ethnicity in the primary school environment.

This study begins from a desire to assist preservice teachers to develop adequate skills to respond equitably to curriculum issues relating to culture and ethnicity. Of particular interest is the role that teachers play in interpreting and applying the curriculum. Whether one defines the curriculum in narrow terms (such as syllabus statements) or broad terms (that include the 'hidden curriculum' (Biddulph (1986)), the classroom teacher has the capacity to change the curriculum at the point of its application in the classroom (Smith, Cook 1992). For this reason, the understandings and belief constructs that teachers and students hold should be a focus of educational inquiry (Parajes, 1992; Short, 1992).

The curriculum exists in a social context and must interact with the culture of the teacher and child. Accordingly, teachers need to be able to determine the unique understanding an individual child may have in order to develop relevant curriculum materials. By centering the curriculum on the child these teachers are able to change the expression of the curriculum to best fit the needs of their students.

This report will provide findings arising from preliminary interviews with three adults, followed by an overview of ways in which findings arising from these interviews have been used to develop a preservice primary teacher training course. The immediate focus is upon using, and evaluating, one method for describing schema. The longterm focus, however, is upon how children understand and make sense of the things teachers try to teach them.

The Interviews

The aim of these interviews was to identify the schema for a particular word or phrase. To do so would require the identification of all those dimensions of meaning that are involved both implicitly and explicitly in how the word or phrase is used. The ideal outcome of such an investigation would be the description of the structure or knowledge related to a particular word or phrase.

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A decsion was made to involve adults at this stage, in order to most readily facilitate full, articulate responses and thereby an analysis of the interview process as a means of identifying schema. It was intended that at a later stage teacher trainees would apply a similar inetrview process with primary school children. Three subjects were interviewed, Margaret, aged forty (high School Teacher), Shirley aged fifty-eight (retired, artist), and Michael, aged twenty-nine (Primary school teacher). All three were native English speaking adults who could be expected to be familiar with the words selected for the study (pencil, making a hot drink, talking). The selected words and phrase were chosen because they were relatively neutral and uncomplicated. The procedure outlined by G. Nuthall (1989) was used, with the addition of the opportunity to draw a diagram of the word or phrase as it formed in the subject's mind.

Each person was interviewed separately, using the same order of focus words or phrase. All three were asked to respond to the Word Association task, Image ask and Systematic Questioning for each word or phrase. After the first task each subject was given the opportunity to draw "a kind of a map or image" of the different ideas associated with the word or phrase. The following aspects were sought by adding this component to the exercise:

1. a non-verbal form of expression.
2. a further understanding of any concrete (eg. 'daffodil') or non-concrete (eg.'flowers') terms used by the subject.
3. the opportunity for the subject to demonstrate possible links between other words or phrases.
4. further information regarding the nature and content of a schema might be made available, particularly in regard to any normalising effects that culture might have upon the way in which the subjects understand, interpret and describe their cognitive processes.
5. verbal-auditory (verbal descriptions) and visuo-spatial (image-based) systems might be used in conjunction with each other in cognitive tasks.

Results and Discussion: A General Overview.

Accuracy in reporting was not anticipated. A naturalistic approach to data collection was adopted whereby an illustration of the nature and level of introspective access on the part of the subjects within this study was sought. A summary of the results follows.

It was found that the subjects were willing to describe their ideas, predominantly as pictorial images, but also using descriptions and role playing in their images. Most of the images described were recollections of past experiences, although in one case, Michael described an image which had never taken place and was constructed from knowledge gained through past experiences.

It was found that the actual process of drawing ideas facilitated each subject to describe further their understanding of the ideas and the origins of these ideas. Verbal and visual descriptions complemented each other. facilitating greater understanding on the part of the interviewer. While the subjects chose to make pictorial drawings some words were added to the drawings where the drawer felt s/he had inadequate skills to draw the concept fully. Although responding to the same tasks, each person had individual responses that exposed different kinds of schema.

Evaluation of the Interview Method

Evaluations and recommendations from this study arise primarily from difficulties encountered in both obtaining and presenting the data.

During the course of this study it became apparent that the notion of schema as "the central or dictionary meaning of a term or phrase" inadequately described the complexities involved in attempting to determine the content of a single schema. All the subjects described a vast range of material that was involved in understanding how they used any one of the words. Shirley, for example, in describing "talking" said that has she chosen to she could have focused on an entirely different image of talking that would have involved further aspects associated with the word.

Although the interviewer sought to expose all the aspects of meaning associated with the one word and therefore, with one schema, it was apparent that many schema were involved in the understanding of meaning of a single word or phrase. The task then seemed to become that of trying to sift through the many schema to find the central schema. It is suggested that to do so and risk ignoring the aspects of meaning provided by the 'schema within the schema' is to limit the understanding of how the word or phrase is used. To fully understand the meaning of a term or phrase does not require the researcher to catch 'a' schema, but to catch 'the schema'. In this way an attempt is made to recognise the importance of the cognitive contextual clues associated with a person's understanding of meaning.

An interviewer's understanding of a word or phrase is dependent upon the subject's verbalising of that understanding. However, pictorial images dominated the subjects' descriptions of the meaning of the words or phrase thereby raising the issue of what effect the interaction between verbal-auditory and visuo-spatial systems might have upon the representation of understanding.

While not wishing to enter a debate contesting the validity or not of pictorial image theories, it is significant that not only did the subjects believe that they were describing different facets of a pictorial image, but that they also chose to draw their understanding in predominantly pictorial form. The process of drawing and the describing the underlying meaning involved in the picture added to the interviewer's data on the nature of the particular schema. To simply verbalise understanding would have provided only part of the schema associated with the word or phrase. At the same time, the use of both types of representation in these memory task seemed to facilitate an improved performance, compared with using only one type of representation.

Memory seemed to be affected by cultural norms. These normalising processes operated upon the image once it had been constructed as well as being involved in the construction itself. As a result all the subjects made assumptions about their images - the women in Shirley's image of "talking" were sitting on a sofa or chairs, rather than on the floor, they spoke nicely to each other, and did not put their feet up on the table. Margaret associated "pencil" with a particular kind of classroom - with walls, and a roof, a polished floor and equipment. Michael assumed that his house had electricity and that he spoke English when asking if his partner would like a hot drink. Although seemingly insignificant these are examples of the way in which certain values and cultural features can be taken for granted, but still impact upon how a word or phrase is understood.

Cultural norms will affect the way in which memory will be reprocessed in order to convey it to a listener. It may be that schema operate to fulfil an editorial function. If it is inappropriate to the social context, a person will perhaps retell a story without including the swear words that they recall being said, In this study the reprocessing of memory was affected by cultural norms that determined what was perceived as significant and how it was perceived. Consequently, it was perceived to be not worth mentioning that the water for making a hot drink came from a tap inside the house and not from a hose or a well. Furthermore cultural norms will affect the way in which the subject will perceive and represent data that is ego-involving. Social desirability or self-esteem maintenance may affect a subject's desire (whether conscious or unconscious) to reveal certain material involved in the understanding of a word or phrase. Thus, it seems likely that in seeking to understand and describe cognitive processes, ordinary people resort to a group of culturally supplied explanations and procedures.

The enculturation process also teaches a belief that introspective awareness is linked to the notion that an individual has access to their own unique storehouse of private knowledge. However, the data from this study suggests that when seeking to understand a word or phrase many people may share the association of some common words and themes. There may be a human desire to have memories that fit an expected pattern. This could signify a social, interactive aspect of memory where it is acceptable that shared experiences assist in the prediction of the schema of another person. Where there are such shared experiences, that storehouse of private knowledge may also become shared, at least in part.

The nature of memory seems to encourage the storage of schema in distinct "packages' that can be accessed by the appropriate retrieval cue, and then processed. "Pencil" immediately triggered memories associated with the use of pencils; "talking" resulted in the reconstruction of past events in which talking took place. However, if a memory is processed and stored in a quasi-visual form, it may require similar cues to retrieve it in that form. What appears to have happened in this study is that the subjects heard the focus word, "translated" it into a visual cue which accessed visually based associations. It would be interesting to assess how responses would be affected by either receiving the focus word in written form, or as an outline drawing.

It may be that different schema might be "activated" and recalled from an area of the memory, even though they are not directly referred to in the word. There would appear to be "codewords' that access schema and that any one schema may be represented by more than one code-word. This multi-coding system, coupled with the tendency to summarise when verbalising complex images or schema, may hold significance for classroom practices. If teachers are to access the appropriate memories of students then appropriate "code words' may have to be used. Furthermore, the child who appears to have a simplistic understanding of a concept, may actually require systematic questioning techniques to be used to reveal their deeper understanding.

Retrieval schema enabled Michael to both recall memories of what has happened in his relationship with his partner, and to construct an expectation of what would happen in an imagined scene involving himself and his partner. In this way, Michael's description of a scene with his partner sketching while he watched from the grass, demonstrated the influence of schema in predicting future situations. His imagination and expectations were based on his past experiences, that is, his schema.

A further aspect of memory appeared to be that the subjects were able to use a "selective filtering system" that made some memories more available than others. To this extent, although aware of features in the background of their images, the subjects had not at that time accessed any information on those features and would not do so until the appropriate cue was given. This seemed to be a form of limiting the amount, or type, of memory transference from memory banks. One form of accessing the memory associated with an object in an image was the use of the "mind's eye". This process enabled the subject to focus on a previously ignored aspect of the schema, seemingly zooming in to focus on it. In this way, Margaret was able to fully describe her posture when "talking". Her schematic attention was focused on this aspect alone, putting other features in her image out of 'focus'. The use of these processes to recall and focus memory arises from the ability of a subject to perceive features without actually remembering.

Schema also functioned to link existing schema with new experiences. When the subjects reviewed the words they had associated with the focus word or phrase they tried to find meaning in the associations. An attempt was made to fit these words into existing schemas:

"I guess I said "work" because when I think of pencil, I think of school."

"I think I meant "company" because it can also mean being in my own company."

The procedure followed in this study was successful in identifying only some of the content of the schema of a word or phrase. The difficulty arises in attempting to define a schema that is by nature interrelated with a myriad of memories. The issue is where to draw the boundaries between the central schema and schema within schema.

The interviewing process may have influenced the subject's understanding of the word or phrase by the types and order of the questions asked, intonation, expectations, etc. Because schema are the unconscious cognitive structures and processes underlying human knowledge, variable, including the subject's own emotional state, may unconsciously affect the representation of knowledge.

The outcome of the procedure involved in this study has been the identification of some of the major functions of schema-based processes, rather than the identification of all the contents of a schema. The former requires analysis of what is common and unique in the data made available in this study; the latter requires either the imposition of boundaries to the schema, or the recognition of the seemingly limitless scope of a single schema.

A major stumbling block in identifying schema for a word or a phrase is the incorporation of the image or pictorially based aspects of meaning. The procedure used in this study required that such aspects be reprocessed into language and lineal based systems. The issue is whether or not the use of such a procedure has affected the nature of the schema 'caught'.

Pre-service Teachers, Culture and Curriculum Change: Using Schema Theory in Teacher Training.

The findings from these initial interviews form the basis of a final year primary training course at the Christchurch College of Education. In this course the trainees are introduced to schema theory, investigate the schema children have of common social events (eg. eating a meal, attending a religious ceremony) and prepare classroom resources that reflect findings from the interviews. As a result, trainees apply action-research theory to the area of culture and ethnicity in education, developing curriculum materials that address identified needs.

This in itself represents a change in the preservice teacher training curriculum. The multicultural education approach that advocated the use of 'checklists' for the "effective teaching" of children identified as belonging to minority ethnic groups, is not used in this course. Instead support is given to the view that teachers are interpreters and purveyors of the curriculum. For this reason it is believed to be essential that teacher training develops the skills to examine and analyse schema (both the teacher's and the child's), in order to achieve a relevant, equitable classroom curriculum.

It is still unclear just how effective this interview method may be in retrieving a sufficiently clear and full 'picture' of a child's schema. Some success was achieved with three adults, but how well will the method adapt to children's verbal skills and a classroom of children? Questions too still remain about how knowledge is stored and retrieved from memory, along with the influence of culture and cultural models on knowledge and understanding. It may be that several methods such as the repertory grid and reflective autobiographical journals may play a complementary role in exploring the minds and cultural constructs of children. Even given the resources (including time) to obtain sufficient information, who should control access to and use of the information?

Pre-service teacher training seeks to develop effective teachers. One expression of the effective classroom teacher is the child-centred classroom. Such a teacher will celebrate cultural diversity and acknowledge the individual understandings children have about their cultural and ethnic identity.

Ultimately, then the expression of the curriculum in the classroom is the domain of our future and current teachers. It is suggested that despite the outstanding issues relating to the application of schema theory in the classroom, it is appropriate for teachers to interpret and apply the curriculum, providing that it is done in a manner that will meet the actual needs of the child. In this way changes to the curriculum remain within the narrow curriculum framework, within the control of the teacher and within the context of the child's understandings. The flow-on effect is that the broader definition of curriculum, concerning both overt and covert classroom processes, is being expanded to acknowledge, affirm and extend the child. In this sense curriculum change is an integral component of the teaching process. Furthermore, it involves two learners: the child, and the teacher.

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